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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/981,402	10/17/2001	Yoshihiro Satoh	N32040200W	6789

7590 04/04/2006

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EXAMINER

RICHARDS, N DREW

ART UNIT	PAPER NUMBER
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2815

DATE MAILED: 04/04/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/981,402

Applicant(s)

SATO, YOSHIHIRO

Examiner

N. Drew Richards

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 23 January 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,2,7-20 and 26-29 is/are pending in the application.
- 4a) Of the above claim(s) 7-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2 and 26-29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 1/23/06 has been entered.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art in view of Cheek et al. (USPAT 6,018,180).

Applicant's admitted prior art teaches in figures 16(a), for example, a semiconductor device structure on a silicon substrate 12 comprising:

- a contact 30 which penetrates an interlayer insulating film 26 and is in physical contact with a diffusion layer (not shown) in the substrate;
- a gate electrode 22 on the substrate and containing a nitride film 20/24 at upper and side portions;

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- an insulating film formed from a gas containing carbon (not shown but taught as part of the capacitor to be formed on the structure).

The admitted prior art does not teach a silicon nitride film for preventing carbon diffusion as claimed.

Cheek teach in figure 12, for example, a device including a gate structure 240, a contact 470 which penetrates an interlayer insulator 440, and a silicon nitride film 360 that is capable of preventing carbon diffusion.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to add the nitride film 360 of Cheek et al. into the device of the admitted prior art. The motivation for doing so is to provide an etch stop to allow improved contact formation to the doped source/drain region.

In combination, adding the thin conformal nitride layer of Cheek et al. to the device of the admitted prior art, the nitride film would have all the claimed features.

With regard to claim 2, as taught by the admitted prior art, the insulating layer includes tantalum oxide and the device is a dynamic random access memory having a memory cell capacitor film including the tantalum oxide.

4. Claims 26-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art in view of Nakamura et al. (USPAT 5,986,299).

With regard to claim 26, the admitted prior art teaches a semiconductor device in figure 17, for example, comprising:

- a contact 30 which penetrates a first interlayer insulator film 26 and is electrically connected to a diffusion layer in the substrate (not shown);
- a capacitor contact 46 that is interposed between a lower electrode of a memory cell capacitor (not shown) and the contact while penetrating a second interlayer insulator film 32 and a third interlayer insulator film 42;
- a conductor 34 which is formed on the second interlayer insulator film and below at least a portion of the third interlayer insulator film and that contains a nitride film 36/40 at upper and side portions, the side portion in direct contact with the capacitor contact and the conductor and not in contact with the third interlayer insulator film; and
- a fourth interlayer insulator film 48 on the third interlayer insulator film.

The admitted prior art does not teach a silicon nitride film between the fourth and third interlayer insulator films as claimed.

Nakamura et al. teach a device in figure 20, for example, that includes a gate structure, and various contacts to an overlying capacitor. Nakamura et al. teach a silicon nitride film 143 between third 115 and fourth 118 interlayer insulator films.

At the time of the invention it would have been obvious to include the nitride film 143 of Nakamura et al. into the device of the admitted prior art. The motivation for doing so is to provide an etch stop so as to avoid overetching during the via/contact

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formation. In combining the nitride 143 of Nakamura et al. into the device of the admitted prior art, the nitride 143 will have the structure and features claimed.

With regard to claim 27, as taught by the admitted prior art, the insulating layer includes tantalum oxide and the device is a dynamic random access memory having a memory cell capacitor film including the tantalum oxide.

With regard to claim 28, the admitted prior art teaches in figure 17 all the claimed features except for the silicon nitride film for preventing carbon diffusion formed between the second and third interlayer insulator films.

Nakamura et al. teach a device in figure 20, for example, that includes a gate structure, and various contacts to an overlying capacitor. Nakamura et al. teach a silicon nitride film 142 between second 112 and third 115 interlayer insulator films.

At the time of the invention it would have been obvious to include the nitride film 142 of Nakamura et al. into the device of the admitted prior art. The motivation for doing so is to provide an etch stop so as to avoid overetching during the via/contact formation. In combining the nitride 142 of Nakamura et al. into the device of the admitted prior art, the nitride 142 will have the structure and features claimed.

With regard to claim 29, as taught by the admitted prior art, the insulating layer includes tantalum oxide and the device is a dynamic random access memory having a memory cell capacitor film including the tantalum oxide.

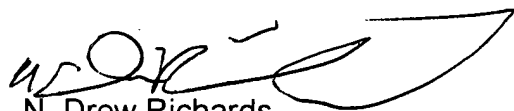
***Response to Arguments***

5. Applicant's arguments with respect to claims 1, 2 and 26-29 have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to N. Drew Richards whose telephone number is (571) 272-1736. The examiner can normally be reached on Monday-Friday 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Parker can be reached on (571) 272-2298. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
N. Drew Richards  
AU 2815